

CLAIMS

What is claimed is:

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1. A motion control system comprising:
- 2 a) a stepper motor; and
 - b) a DC motor mechanically coupled to the stepper motor; and
 - 4 c) an electronic control module electrically connected to both motors for controlling both motors.
2. The motion control system of claim 1 wherein the system is operated with the
- 2 stepper motor as the sole source of motive power and with the DC motor de-energized.
3. The motion control system of claim 1 wherein the system is operated with the DC
- 2 motor as the sole source of motive power and with the stepper motor de-energized.
4. The motion control system of claim 1 wherein the system is operated with both
- 2 motors energized, the DC motor assisting the stepper motor.
5. The motion control system of claim 1 further comprising circuitry that senses back
- 2 EMF signals from the stepper motor and provides position-indicating signals to the electronic control module.
6. The motion control system of claim 5 wherein the system is operated with
- 2 a) the DC motor as the sole source of motive power; and

10057342.012302

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- b) the stepper motor de-energized; and
 - 4 c) the sensing circuitry sensing the stepper motor back EMF and providing
position-indicating signals to the electronic control module; and
 - 6 d) the electronic control module using the position-indicating signals to control
the DC motor.
7. A scanner comprising:
- 2 a) a stepper motor; and
 - b) a DC motor mechanically coupled to the stepper motor; and
 - 4 c) an electronic control module electrically connected to both motors for
controlling both motors.
8. The scanner of claim 7 further comprising scanning means for providing relative
2 motion between an original and a scanning mechanism.
9. The scanner of claim 8 wherein the scanner is operated with the stepper motor as
2 the sole source of motive power and with the DC motor de-energized.
10. The scanner of claim 8 wherein the scanner is operated with the DC motor as the
2 sole source of motive power and with the stepper motor de-energized.
11. The scanner of claim 8 wherein the system is operated with both motors
2 energized, the DC motor assisting the stepper motor.

10057342-012302

12. The scanner of claim 8 further comprising circuitry that senses back EMF signals
2 from the stepper motor and provides position-indicating signals to the electronic
control module.
13. The scanner of claim 12 wherein the scanner is operated with:
2 a) the DC motor as the sole source of motive power; and
b) the stepper motor de-energized; and
4 c) the sensing circuitry sensing the stepper motor back EMF and providing
position-indicating signals to the electronic control module; and
6 d) the electronic control module using the position-indicating signals to control
the DC motor.
14. A method of motion control comprising the steps of:
2 a) coupling a stepper motor mechanically to a DC motor; and
b) energizing at least one of the motors and controlling it using an electronic
4 control module.
15. The method of claim 14 wherein the motor energized is the stepper motor.
16. The method of claim 14 wherein both motors are energized and the DC motor is
2 used to assist the stepper motor.
17. The method of claim 14 wherein the motor energized is the DC motor.
18. The method of claim 17 further comprising the steps of:

10057342.012302

- 2 a) sensing back EMF signals from the stepper motor using sensing circuitry; and
b) determining the position of the motors from the back EMF signals; and
4 c) controlling the DC motor based on the position.

19. A motion control system comprising:

- 2 a) a stepper motor; and
b) a DC motor; and
4 c) coupling means for mechanically coupling the stepper and DC motors; and
d) controller means electrically connected to the motors for controlling the
6 motors.

20. The motion control system of claim 19 further comprising:

- 2 a) sensing means for sensing back EMF signals from the stepper motor; and
b) means for determining the positions of the motors from the back EMF signals;
4 and
c) means for controlling the DC motor based on the position.